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UNDERMINING THE PRINCIPLE OF CONCENTRATION? EU DEVELOPMENT POLICIES AND THE SOCIO-ECONOMIC DISADVANTAGE OF EUROPEAN REGIONS

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Abstract: *A number of empirical analyses has found evidence that the impact of the EU structural funds on the growth performance of assisted regions is comparatively weak and has failed to promote the objective of economic and social cohesion. This literature explains this lack of convergence in terms of the policies implemented, which, from this perspective, should be considered as social (or redistributive) rather than as development policies. This paper puts forward a different explanation for the failure to deliver the expected cohesion, namely that the distribution of the funds to the regions may have been à priori distorted by either political equilibriums or inaccurate assumptions over the most cost-effective allocation of the funds. As a consequence the principle of concentration has been undermined, as, among the poorest regions in the EU there is little correlation between expenditure and socio-economic disadvantage. In order to assess this potential explanation the geographical distribution of both sources of socio-economic disadvantage and the regional allocation of structural funds are compared, by means of a Heckman two-step selection model. The results show that the sources of disadvantage are more spatially concentrated than the funds devoted to compensating such disadvantage and uncover a weak association between structural disadvantage and EU funding. Consequently, structural policies could prove helpful to promote development in the EU's lagging regions provided that the necessary corrections are introduced in their allocation mechanism in order to increase the geographical concentration of the funds and by more adequately earmarking the available resources to the most disadvantaged regions, which the analysis indicates as having the best potential for convergence.*

Keywords : Regional Policy, Regional development, socio-economic factors, Heckman selection models, Regression models.

JEL Classifications : C24, O18, R11, R58

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1.0 Introduction

The debate over the EU budget 2007-2013 made clear the need for an in-depth understanding of the structure and the impact of EU development funds. The scarce resources need more effective targeting as regards the real requirements of EU countries and regions in order to deliver the benefits expected. Regional development policies have become even more important after the enlargement of the European Union, as this has, on the one hand, reduced the available resources in comparison to the target areas and, on the other, heightened economic disparities between member states. However, the urgency for a highly cost/effective EU development policy should take account of the evidence, provided by a number of empirical studies, of a limited or even insignificant impact of structural fund expenditure on the economic performance of the assisted areas. Empirical evidence of the impact of structural expenditure is so weak as to lead Boldrin and Canova (2001) to conclude that: "regional and structural policies serve mostly a re-distributional purpose, motivated by the nature of the political equilibriums upon which the European Union is built"(p.211). Conversely, an appropriate counterfactual scenario ("what would have happened without an active regional policy? Could inequalities possibly have risen even more?"), while crucial for such a policy assessment, is hard to construct and heavily dependent upon the assumptions that underlie it.

On the basis of such considerations this paper has adopted a different perspective by focusing its attention upon the *à priori* structure of the policy rather than upon its impact. In so doing the paper aims at distinguishing between two different explanations for the weak impact of the funds: the implementation of inappropriate policies (as suggested by the existing literature) or an *à priori* bias in the geographical allocation of the funds which undermines the principle of concentration and prevents the intervention from targeting the real sources of competitive disadvantage of the EU regions. In line with this objective the paper analyses the regional allocation of the EU funds in order to assess whether (and to what extent) it is consistent with the factors that have been shown to hamper the local economy's capability to grow and develop at an adequate pace. In order to reach this objective the paper aims at bringing together two separate strands of literature: the literature on the analysis of the regional policies of the EU and that on the role of underling socio-economic conditions in the explanation of differential regional growth performance. While the results of

some of the former are biased by the abovementioned counterfactual problem, the latter has rarely been fully exploited so that direct economic policy implications can be drawn. This paper aims at filling the gap between these two strands of literature by directly comparing the socio-economic preconditions for successful regional development with the correlated allocation of structural funds. On the basis of the evidence provided by the literature and in order to maximise its chance of success, the EU regional funds should be allocated according to the geography of such sources of competitive disadvantage. In other words, given that a set of socio-economic conditions have been shown to be factors hampering the economic success of many EU regions, the EU funds should be allocated in order to "compensate" the structural disadvantage of the assisted areas.

This paper aims at assessing precisely this potential bias in the geographical allocation of the structural funds (Objective 1 and 2) under both the 1994-1999 and 2000-2006 programming periods in order to shed some light on the coherence of the policy hitherto pursued and draw some implications for the forthcoming programming period.

More specifically, in this paper:

a) the spatial concentration of structural expenditure is analysed. A low degree of spatial concentration of development funds would contradict the principle of territorial concentration introduced in the 1989 reform of the funds as an important prerequisite for their effectiveness;
b) the spatial concentration of EU funds is contrasted with a specifically developed indicator of the socio-economic disadvantage of the EU regions. This analysis will allow us to investigate the coherence of the EU regional policies in terms of the structural disadvantage of EU regions thus uncovering a potential inconsistency between policy objectives (favouring disadvantaged areas) and the beneficiaries of the funds;
c) an empirical model to assess to what extent regional funds are, in fact, associated (in a statistically significant way) with the above-mentioned sources of competitive disadvantage is developed;
d) A simple convergence analysis is pursued in order to show that increasing the concentration of the funds and investing in the most disadvantaged areas is the best strategy to promote cohesion.

A weak territorial concentration and a reduced correlation between the geographical allocation of the funds and the structural disadvantage would

suggest that even before their operational translation into social or redistributive (rather than development) policies the reasons for the weak impact of the funds might be found in their inability to correctly select their targets i.e the regions where socio-economic disadvantage is more severe.

This paper is organized into three sections. In the first section the EU development policies are analysed in the light of the existing literature to single out the potential causes for their reduced impact and set the foundation for a subsequent analysis. In addition, the sources of regional socio-economic disadvantage identified by the literature on regional growth in the EU are briefly reviewed. In the second section the methodology followed to assess the spatial structure of both funds and socio-economic disadvantage is presented and the empirical model to measure the correlation between development funds and socio-economic disadvantage is outlined. In the third section the empirical results are discussed. The fourth section concludes with some implications for the design of regional policies.

2.0 Regional policy and structural disadvantage

2.1 The EU regional development policy, its objectives and the existing explanations for its weak effects

The European Community Treaty states that "(…) the Community shall aim at reducing the disparities between the levels of development of the various regions and the backwardness of the least favoured regions or islands, including rural areas"(Article 158). The same objective is included in the EU draft Constitution (article III-220).

The financial resources devoted to pursue this objective have grown substantially over the years: from ECU 68 billion (at 1997 prices) allocated by the Brussels European Council in 1988 to the Euro 195 billion (at 1999 prices) of the 2000-2006 programming period[1] (European Commission website). Altogether the expenditure for regional policy is particularly significant when assessed as a percentage of the GDP of many lagging regions: 2.7% (of national GDP) in Greece, 2.8% in Portugal, 1% in Spain, 0.7% in Ireland in the year 2000 (E.C. 2000).

[1] In addition the Cohesion Fund distributes resources for about □2.5 billion per year from 2000 to 2006, for a total of □18 billion (at 1999 prices).

However, while the amount of resources devoted to the objective of promoting an "overall harmonious development" of the Union has not been negligible, the evidence of the influence of such resources on the actual level of territorial cohesion of the EU is rather mixed. In particular the literature has emphasized:

a) the lack of upward mobility of Objective 1 regions, which have remained almost the same from 1989 to 2005 (with a few exceptions[2]).
b) the absence of convergence across EU regions in contrast with the convergence observed across the member states which dominated the past twenty-five years of European growth (Boldrin and Canova, 2001; Magrini, 1999; Puga, 2002). Rather, a process of "club convergence" would seem to be in place across the EU regions thus leading to the formation of clusters of regions with persistently different income levels (Canova, 2004; Quah 1996 and 1997).

On the basis of such evidence, which is undoubtedly the results of a complex set of forces in place in the EU economy, many of which not related to any policy action, some empirical studies have attempted to single out the link between structural funds and regional economic development in order to assess the impact (if any) of the funds upon regional economy.

These contributions address the different factors that seem to prevent regional policy from delivering its intended benefits. Midelfart-Knarvik and Overman (2002)'s analysis highlights the distortion produced by structural funds on the location decision of R&D intensive firms. Structural funds provide an incentive for firms to locate in assisted regions with a poor endowment of human capital, thus producing an inefficient outcome for both firms (that cannot benefit from an adequate labour pool in the local area) and workers (who do not benefit from an increase in labour demand due to the skill mismatch). Thus, EU aid should be focused "on helping regions change their endowments and specialize according to the resulting comparative advantage" (p.352). Though produced using different

[2] Abruzzo (Italy) lost its Objective 1 status in 1997. A few regions and areas lost their Objective 1 status with the 2000-2006 programming period but received transitional support under Objective 1 of the Structural Funds for the period from 1 January 2000 to 31 December 2005 or 2006 (Commission Decision 1999/502/EC).

theoretical frameworks[3], this evidence is not far away from the results of Cappelen et al. (2003) who concluded that the impact of structural funds is positive but "crucially dependent on the receptiveness of the receiving environment" (p.640). These findings emphasize the role of relatively more favourable contextual conditions/endowment, which in their turn, lead to a paradoxical situation whereby the EU funds fail to work precisely where they are most needed.

Rodriguez-Pose and Fratesi (2004) by more directly assessing the impact of structural funds on regional growth performance, find that such impact crucially depends on the distribution of resources across development axes. Where fund allocation more closely addresses such contextual conditions, i.e. by being channelled towards human capital enhancement, its effects tend to be positive and significant while this is not the case when other objectives are pursued (i.e. infrastructure).

Thus, the evidence briefly reviewed above suggests that a cause for the relatively weak impact of the investments pursued up to now might be the "operational" mismatches between policy targets and the real needs of the lagging regions when financial resources are divided among the different axes and then translated into concrete actions. In this paper we contrast this explanation for the unsatisfactory performance of structural expenditure with an alternative explanation: potential "spatial" mismatches between areas where the factors of disadvantage are concentrated and areas where the resources being channelled by the policy design might *a priori* have prevented the funds from delivering the expected benefits.

2.2 Territorial concentration and correlation with structural disadvantage: an alternative explanation for the weak impact of structural funds

Structural funds are designed to promote economic and social cohesion in the EU by promoting the economic development of lagging regions (Objective 1) and assisting economic and social conversion in areas experiencing structural difficulties (Objective 2). However, "since 1994 the connection between poor nations and structural spending has been greatly diluted (as) large parts of Finland and Sweden were designated as eligible,

[3] While Midelfart-Knarvik and Overman (2002) focuses the determinants of firms' location Cappelen et al. (2003) develop a "new growth theory" model with a Schumpeterian perspective.

and even some Austrian regions, together with all of the former East Germany" (Baldwin and Wyplosz, 2003; par.9.5). It was the pressure for setting aside budget resources aimed at financing the eastward enlargement of the EU that forced a reduction in both the areas eligible for assistance and community initiatives in the Agenda 2000 reform of the structural fund (Armstrong, 2001). Such a reduction was explicitly inspired by the principle of territorial and financial concentration: i.e. the relatively scarce resources for the EU development policies should be channelled more specifically to where they are most needed in order to maximise their effectiveness. Over time the need for an increase in the geographical concentration of the structural funds expenditure has become progressively more apparent and "concentration" has been included, within the "framework for cohesion policy 2007-2013", among the key leading principles for the new programming period[4].

But why is geographical concentration so important for the impact of the policy? Intuitively a smaller number of beneficiaries may allow a larger amount of resources to flow in selected regions. However, not only is the level of expenditure in the objective region relevant in itself but also that in its neighbouring regions (Dall'Erba, 2005). By this we mean that the spatial externalities produced by the implementation of regional development programmes of whatever nature need to be taken into account because an insufficient spatial "concentration" of the funds may decrease their impact by reducing the amount of such externalities "flowing" within the assisted areas.

In addition, the spatial structure of the funds needs to be assessed in combination with the underlying socio-economic conditions of the assisted regions. In order to maximise their impact the funds should be directed where persistent factors of disadvantage prevent the local economy from fully expressing its potential i.e. the geography of the funds should reflect as much as possible the geography of the structural disadvantage of the EU regions.

[4] COMMUNICATION FROM THE COMMISSION, Brussels, 05.07.2005 COM(2005) 0299, "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013", p.8.

2.3 Where are the funds most needed? Evidence from the literature.

A specific set of factors has been shown by the literature to act as structural sources of competitive disadvantage for the local economy. Lagging regions in the EU, notwithstanding their profound differences under many respects, share a common set of analogous social conditions whose role is emphasized by the economic restructuring accelerated by the process of European integration (Rodriguez-Pose 1994 and 1998a). While some economic factors (such as capital and technology) seem more able to adjust in response to the challenges of the EU integration (by virtue of their relatively higher mobility), social structures tend to be much less flexible. Consequently it is possible to identify a specific set of "structural" conditions that are persistently associated with poor economic performance and which are very slow to adjust themselves endogenously. These factors concern, to different extents, features of the labour force, the employment of local resources, the demographic structure and change, and the accumulation and quality of human capital (Rodríguez-Pose 1998b).

However, the distinctive role of underling socio-economic conditions must be assessed in a theoretical framework where, in line with Lisbon Agenda objectives[5], innovation is explicitly considered the driving force of growth. The objective of an innovation based growth model for the Union has guided the implementation of the EU structural policies and for the assessment of their results since the year 2000. However, with the drawing up of the draft Community Strategic Guidelines "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013" which set out a framework for new programmes for the next programming period, "knowledge, innovation and the optimisation of human capital" are explicitly assumed as means for Europe to "renew the basis of its competitiveness, increase its growth potential and its productivity and

[5] The European Council, which met in Lisbon in 2000, set the goal of making the EU "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" (Presidency Conclusions, par. 5). The regional dimension of social cohesion is, together with full employment, explicitly mentioned as the ultimate expected outcome of the strategy. Crucially, the Lisbon strategy relies on the capability of knowledge to be translated into growth in order to deliver economic development. Furthermore, by focusing policy efforts on the creation and diffusion of knowledge, growth is not only supposed to be increased but also qualitatively improved in terms of sustainability, quality of employment, and (social and regional) cohesion.

strengthen social cohesion". (Presidency conclusions, European Council, March 2005 and incipit of the above-mentioned draft Community Strategic Guidelines). In addition the role played by the cohesion policy in pursuing the Lisbon agenda will increase in 2007-2013 programming period as emphasized in 2007-2013 Financial Perspective, which concentrated expenditure on the Lisbon objective (Presidency conclusions, European Council, December 2005).

In this political framework a variety of contributions have reformulated Romer's endogenous growth model in order to explicitly recognise growth as a multivariate process where human capital accumulation but also sectoral specialisation of the labour force, migration, university education and geographical location emerge as relevant factors for economic performance (Fagerberg et al. 1997; Cheshire and Magrini 2000).

More generally, the role of socio-economic conditions in the translation of innovation into regional growth has been treated in a systematic way by the introduction of the concept of the "social filter" (Rodriguez-Pose, 1999): the interaction of a complex set of economic, social, political and institutional features that makes some regions "prone" and others "averse" to innovation. In line with the evidence produced by this strand of literature, the multifaceted socio-economic conditions of the EU regions are introduced in our analysis by means of a set of variables describing the local socio-economic realm. Innovation averse socio-economic conditions, by persistently hampering the growth capabilities of some areas, trace out the geography of the structural disadvantage of the EU territories. As a consequence, it seems reasonable that in terms of both equity and efficiency, the geographical allocation of regional funds should follow the spatial structure of these factors. Thus, as regards equity such a distribution of resources across regions should compensate the residents of "disadvantaged" regions for unfavourable starting conditions. In terms of efficiency, giving adequate attention to the structural sources of competitive disadvantage of assisted regions seems the most effective way of promoting the full employment of local resources.

3.0 Where do the funds actually go? Assessing their territorial concentration and the coherence of their geographical allocation.

In the previous section we discussed how the weak impact of the structural policies of the EU has been explained in terms of its translation into policies not correctly tailored to the needs of the assisted areas. However, we also

discussed the importance of territorial concentration and the geographical distribution of the funds in relation to the structural disadvantage of the EU regions. This section sets out to outline an empirical strategy to assess this second hypothesis by investigating the spatial structure of the allocation of the EU structural funds and their relationship with the sources of structural disadvantage discussed in the previous section. The descriptive spatial analysis of both phenomena will be followed by an empirical analytic model that singles out the importance (statistical significance) of the socio-economic factors in the distribution of the EU structural funds (Objective 1 and 2) under both the 1994-1999 and 2000-2006 programming periods, in order to shed some light on the coherence of the policy hitherto pursued.
In this section the methodology followed to pursue such analysis is briefly presented together with the corresponding dataset. The empirical results will be discussed in the fourth section.

3.1 A measure for socio-economic conditions

The variables which seem to be more relevant for describing the socio-economic disadvantage of a regional space – as discussed above - are those related to three main domains: educational achievements, the productive employment of human resources and demographic structure. From the first domain, tertiary educational attainment (of both the population and the labour force) and participation in lifelong learning programmes are assumed as a measure for the accumulation of skills at the local level. In the second domain, the percentage of labour force employed in agriculture and the long-term component of unemployment are included in the analysis in order to capture the amount of human resources excluded from productive employment. Long term unemployment represents the incidence of people whose possibilities of being productively involved in the labour market is persistently hampered by inadequate skills. Agricultural employment is frequently synonymous with "hidden unemployment" [6] and a backward structure of the local economy. For the third domain, the percentage of population aged between 15 and 24 is assumed as a proxy for the flow of new resources entering the labour force, thus "renewing" the existing stock of knowledge and skills. These factors are autonomously introduced into the

[6] Where long term unemployment tends to be persistently high and labour mobility low, less skilled workers tend to move to the countryside to be employed, with a very low marginal productivity, in (frequently family owned) small farms thus allowing an easier access to primary goods.

analysis in order to assess their individual weight. However, in order to assess their "global" relationship with the allocation of structural funds, while minimising the problems of multicollinearity[7], the socio-economic variables are combined by means of Principal Component (PC) Analysis (Jollifee, 1986). Consequently, the set of variables discussed above is "reduced" to an individual variable that is able to preserve as much as possible of the initial information (variability) (see Appendix B for the results of the PC analysis and technicalities). Such procedure allows us to handle an individual variable that "summarizes" the multifaceted nature of the socio-economic conditions of each region.

3.2 The empirical model for the allocation of funds across regions

This section outlines the empirical model for the analysis of the role of socio-economic disadvantage in determining the allocation of structural funds. The model aims at estimating a "hidden" decision function of the European policy maker in the allocation of the structural funds across regions. Such a "decision function" would reflect the "rationale" of the policy thus uncovering the coherence of the policy design with the identified sources of structural disadvantage. The estimation of the model, by regressing the per capita regional commitments of the structural funds on the sources of socio-economic disadvantage identified above, will allow us to "measure" the role of these factors in the actual allocation of the funds. The reduced weight of these factors in the allocation decision, which might be a possible explanation for their limited impact, can reflect:

a) the predominant role of "power" factors in the design of the policy where the present allocation of the funds might be the result of the political equilibrium reached in the bargaining process between the Commission, the national governments, the local governments and the various pressure groups;
b) the willingness of the European policy-maker to privilege, in the distribution of the funds, the relatively more advantaged regions on the basis of the (questionable, as we will discuss later) assumption that this category of regions would show a better potential for growth and development.

Two models will be estimated in the empirical analysis. A first model analyses the allocation of Objective 1 and Objective 2 funds separately

[7] Which prevents their simultaneous introduction into the regression equation.

(Equations 1 and 2), while a second model considers the overall regional distribution of the structural funds (Equation 3).

Consequently, the first part of the empirical analysis is based on a two-stage Heckman selection model (Heckman, 1979; Green 2003). The first stage determines "eligibility" as an Objective 1 (Objective 2) area. Such a decision is based on specific criteria that should improve the territorial concentration of the funds and, *à priori*, select the most disadvantaged areas according to each objective's "mission". However, such a decision can, in fact, be biased for the reasons discussed above. Consequently, the first step of the Heckman selection model aims at assessing, through a probit model, how the factors of socio-economic disadvantage in fact influence the probability of a region of being assisted (or not). The model is estimated separately for Obj1 regions and for Obj2 regions in both the programming periods considered.

The estimated model is the following:

$$w_i = Z_i'\gamma + e_i \qquad (1)$$

where

w_i=1 if the region i is an assisted region and w_i=0 if the region is not assisted;

and

$\Pr(w_i = 1) = \Phi(\gamma' Z_i)$ and $\Pr(w_i = 0) = 1 - \Phi(\gamma' Z_i)$;

where Φ(x) is the normal cumulative distribution function, Z_i is a set of socio-economic explanatory variables described above, γ is a vector of parameters, and e_i is the error term.

In a second step the level of support is regressed on its potential determinants while taking into account the selection bias introduced in the sample by the à priori selection of eligible areas.

Consequently, the following second-step H-C OLS model is estimated:

$$y_i = \alpha' X_i + e_i \qquad (2)$$

Where y_i (>0) is the level of per capita commitment in region i, α is a parameter vector, X are the explanatory variables and e_i is the error term.

The set of explanatory variables includes: the socio-economic conditions, a set of national dummy variables (to estimate a potential "national" bias in the distribution of the funds) and the Inverse Mills Ratio (IMR). The IMR is calculated from the first stage probit model and is used in the second step

as an instrument for the latent variable that determines whether an area is eligible or not. In other words the IMR links the participation of the regions to the distributions of the funds (1st step) with the amount of funds received (2nd step).

The second part of the empirical analysis will focus on how socioeconomic factors drive the observed level of total regional expenditure per capita (under both Objective 1 and Objective 2): the interaction of Objective 1 and Objective 2 purposes might even further "dilute" the policy targets.

Consequently, we will estimate an OLS model regressing the commitment level per capita under both Objective 1 and 2 on the socioeconomic variables and a set of national dummy variables:

$$y_i = a' X_i + e_i \qquad (3)$$

Where y_i (that this time includes all the regions included in the sample) is the level of per capita commitments in region i, a is a parameter vector, X are the explanatory variables (socio-economic factors + national dummies) and e_i is the error term.

3.3 The dataset

Since the objective of the analysis is to assess the coherence of the spatial allocation of structural funds with the sources of competitive disadvantage of the EU regions it is necessary to identify the most appropriate spatial scale of analysis in order consider homogeneous and (to the extent possible) functionally "self contained" units in terms of both their capacity to receive funds (and exert political pressure for this purpose) and their socio-economic structure. Where funds are allocated to areas without any corresponding governance level and a reduced functional self-consistency, a leakage effect seems to prevail (due to the functional links of the area with the rest of the region) thus forcing us to assume that the entire region is a beneficiary of the funds. Consequently, given the constraint of data availability, but also for reasons of homogeneity and coherence in terms of the relevant institutional level discussed above, the analysis is based upon NUTS1 regions for Germany, Belgium and the UK and NUTS2 for all other countries[8] (Spain, France, Italy, the Netherlands, Greece, Austria, Portugal, Finland).

[8] Countries without a relevant regional structure (Denmark, Ireland, Luxemburg) were necessarily excluded from the analysis. In addition, regional data on many variables

The data on the regional distribution of commitments[9] for structural fund expenditure was collected on the basis of the information provided by the European commission on its website (Inforegio) and takes into account all structural funds[10]. In addition, the analysis relied upon an Annex of the EC report "The impact of structural policies on economic and social cohesion 1989-99". For the sake of comparability between programming periods, Objective 1 and Objective 6 data, on the one hand, and Objective 2 and Objective 5b, on the other, are combined together for 1994-1999 commitments.

The Operational Programmes (OP) and Single Programming Documents (SPD) for both programming periods have been associated to the appropriate NUTS region thus providing the total committed expenditure in each region. The total commitment has been divided by the average population of the region during the respective programming period in order to obtain per capita expenditure.

The data for the socio-economic conditions of the EU regions are available from Eurostat and stored in the REGIO databank. The year 1994 is assumed as reference year for the socio-economic conditions variables in order to minimize any potential endogeneity between higher (lower) funds and 2000-2006 programming periods see

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are not available for Sweden. As far as specific regions are concerned, no data are available for the French Départments d'Outre-Mer (Fr9). Uusimaa (Fi16) and Etela-Suomi (Fi17) were excluded from the analysis due to the lack of data on socio-economic variables. Etela-Suomi (Fi17) and Trentino-Alto Adige (IT31) were excluded from the analysis as they have no correspondent in the NUTS2003 classification, thus preventing us from matching data available only in the new NUTS classification. Islands (PT2 Açores, PT3 Madeira, FR9 Departments d'Outre-Mer, ES7 Canarias) and Ceuta y Melilla (ES 63) were excluded from the analysis as time-distance information, necessary for the computation of spatial weights (appendix A), is not available.

[9] Only data for commitments rather than expenditure are available. However the use of commitments data is coherent with our theoretical framework, as we aim at analysing the à priori structure of the policy rather than estimating the impact of actual expenditure.

[10] The European Regional Development Fund (ERDF), the European Social Fund (ESF), the Guidance section of the European Agricultural Guidance and Guarantee Fund (EAGGF-Guidance) and the Financial Instrument for fisheries guidance (FIGS).

4.0 Empirical results

4.1 Spatial concentration: structural funds vs. socio-economic disadvantage

The analysis of the spatial distribution of the variables is pursued by calculating the value of Moran's I (see appendix A for technicalities). Moran's I is a measure for the global spatial autocorrelation of the variables (Cliff and Ord, 1981). When Moran's I is significantly different from zero the variable of interest exhibits a systematic spatial pattern. A positive value of this index means that areas with a high (low) level of per capita structural expenditure tend to be clustered close to other areas with high (low) expenditure. The same line of reasoning is valid for the factors of socio-economic disadvantage, where a positive value of the index means a pattern of clustering of regions with similar high/low values. The magnitude of the indicator provides a measure of the strength of the spatial pattern i.e. the extent of the clustering process of similarly high/low values.

Tab.1 - Objective 1 and Objective 2 Funds per capita, 1994-1999 and 2000-2006; Social Factors.

Variables	I	E(I)	sd(I)	z	p-value*
		Programming Period 1994-1999			
Objective1	0.102	-0.008	0.009	11.649	0
Objective 2	0.039	-0.008	0.009	5.061	0
Total expenditure	0.095	-0.008	0.009	10.929	0
		Programming Period 2000-2006			
Objective1	0.142	-0.008	0.009	15.911	0
Objective 2	0.094	-0.008	0.009	10.781	0
Total expenditure	0.149	-0.008	0.009	16.658	0
			Social Factors		
Social Factors§	0.223	-0.008	0.009	24.329	0

*1-tail test

Table 1 shows the value of Moran's I for regional expenditure under Objective 1 and 2 and for total structural fund expenditure. The table shows that a clear spatial pattern is identifiable in the distribution of both funds and indicators of socio-economic disadvantage. Moran's I is positive and significant in all cases, thus showing a positive spatial autocorrelation: regions with a high (low) level of expenditure (socio-economic disadvantage) tend to be clustered together. This result is in line with the principle of concentration of the funds repeatedly claimed by the European Commission. However, if the results are examined in further details by considering the magnitude of the index, it is possible to note, as was expected, that Objective 1 tends to be more concentrated than Objective 2 expenditure where the latter seems to respond more weakly to this principle of concentration (in both the programming periods). It must be noted, though, that the overall territorial concentration of expenditure has increased after the Agenda 2000 reform of the structural funds: Moran's I for Objective 1, Objective 2 and total expenditure has increased from one programming period to the other. However, as we discussed in the previous sections, the territorial concentration of the funds should be compared with that of the socio-economic sources of competitive disadvantage. This benchmark is provided by the last line of table 1 which shows Moran's I for the "Social Factors" variable which is calculated through the Principal Component Analysis from the whole set of socio-economic variables previously discussed. The comparison between the magnitude of Moran's I of the "Social Factors" and that of structural expenditure shows that social factors are more spatially concentrated than structural funding. Thus, even if the territorial concentration of expenditure increased with successive reforms of the structural funds it seems to be still insufficient when compared to the spatial pattern of the sources of structural disadvantage. This provides the first evidence in favour of our hypothesis of there being a "spatial mismatch" between the factor of structural disadvantage and development funds, thus encouraging further analysis of the geographical allocation of the funds. Territorial concentration of the funds per se might not be sufficient for the policy to deliver the expected benefits, a closer adherence to the regional sources of structural disadvantage might be necessary.

4.2 The drivers of the regional allocation of structural funds

In the previous paragraph the spatial distribution of the structural funds has been analysed. In the following part we discuss the estimation results of our empirical model, whose aim is to highlight the weight of the observed socio-economic factors in the "implicit" decision function for the regional allocation of structural funds. Following the specification presented in par. 3.2 we estimate a two-stage Heckman selection model for the allocation of Objective 1 (Tab.2) and Objective 2 (Tab.3) funds. The tables show the estimations results for the programming periods 1994-1999 (on the left hand side of the table) and 2000-2006 (right hand side). For each programming period equations (1) and (2) are estimated by regressing the funds on the "Social Factors" variable (a) and on some of its individual components[11] (b).

When looking at the results for the Probit Selection Model (lower part of the tables) it should be born in mind that the magnitude of the parameters estimated by the probit technique does not have a direct meaning in terms of the extent of the corresponding effect. However, the parameters are informative as far as their signs and significance are concerned.

[11] As noted previously multicollinearity prevents the simultaneous inclusion of all these variables into the regression.

Tab.2 - Heckman Selection model, Objective 1 Funds per capita, 1994-1999 and 2000-2006.

	Programming Period 1994-1999		**Programming Period 2000-2006**	
	Equation (2)			
Variables	Coef.	Coef.	Coef.	Coef.
	(a)	*(b)*	*(a)*	*(b)*
Social Factors§	3622.424 *(21602.14)*		1218.957 *(10951.03)*	
Education		-4988.11* *(2562.976)*		-1913.78*** *(456.1678)*
Agriculture		-1348.16 *(1043.342)*		-312.165 *(222.0423)*
L.T.Unempl.		-574.539 *(588.8321)*		-89.498 *(110.8817)*
Young Pop		-3218.96 *(2456.867)*		-1067.57** *(503.5399)*
National Dummies				
de	1286.602 *(3153.09)*	1044.413*** *(362.087)*	264.6077 *(1293.069)*	291.6251 *(68.56178)*
it	10.02819 *(2446.981)*	-119.275 *(215.7996)*	83.11813 *(1066.923)*	49.53745 *(46.58662)*
at	198.3732 *(3683.407)*	309.7738 *(279.0372)*	142.7548 *(1579.302)*	180.4558*** *(60.11469)*
be	498.6349 *(3469.236)*	281.757 *(304.0943)*	100.9242 *(1514.511)*	95.4871 *(62.36345)*
pt	-248.376 *(2651.336)*	-362.557* *(186.396)*	157.058 *(1134.62)*	123.3903*** *(38.62917)*
nl	512.8831 *(3378.771)*	369.2325 *(316.798)*	122.9396 *(1487.263)*	134.3599*** *(66.7445)*
uk	745.6835 *(3216.694)*	398.8849* *(227.0967)*	193.8667 *(1310.763)*	129.0245*** *(43.20416)*
es	621.0167 *(2306.694)*	634.0799** *(288.4948)*	252.0606 *(997.5152)*	319.0792*** *(59.05076)*
gr	192.1769 *(2456.519)*	224.2701 *(187.8398)*	-21.8073 *(1054.395)*	-1.55839 *(39.39773)*
fi	534.0902 *(2926.159)*	233.248 *(286.6558)*	0.204899 *(1271.065)*	-32.9576 *(57.13414)*
Constant	3561.73 *(14885.26)*	2025.47*** *(659.4408)*	1614.26 *(11007.22)*	574.4937*** *(137.1147)*
	Probit Selection Model (Equation 1)			
Social Factors§	-1.4158*** *(0.348857)*		-1.0370*** *(0.329578)*	

Education		5.044067* *(2.89385)*		5.754955*** *(2.826307)*
Agriculture		17.32992*** *(3.535073)*		15.12283*** *(3.218646)*
L.T.Unempl.		3.435833*** *(1.171702)*		2.609007*** *(1.091462)*
Young Pop		5.912144 *(4.973609)*		6.068956 *(4.78766)*
Constant	0.265963 *(0.17737)*	-4.737*** *(1.13581)*	0.16692 *(0.172587)*	-4.25439*** *(1.07249)*
rho	-1	-1	-1	-0.94973
sigma	4846.965	358.7948	2111.375	69.35247
lambda	-4846.97 *(23328.48)*	-358.795** *(178.5998)*	-2111.37 *(15897.1)*	-65.866* *(41.52635)*

§This variable is the linear combination of the socio-economic variables described in the text and is calculated through the Principal Component Analysis
*, ** and *** denote significance at a 10%,5% and 1% level respectively. SE in parentheses

As regards Objective 1 funds (Tab.2), the social factors variable shows a negative sign and a high significance level in both the programming periods thus implying that favourable socio economic conditions (i.e. a high value of the social factors variable) reduce, as expected, the probability of being considered an eligible area (column a). This seems to confirm that the actual eligibility criterion, based on per capita income, is a good proxy for weak socio-economic conditions. However, if the factors influencing the probability of becoming an eligible region are considered in greater detail (column a), we shall notice that the "traditional" sources of disadvantage are more "rewarded" by this system: the "percentage of labour force concentrated in agriculture" and "long term unemployment" significantly increase the chances of being under the 75% of the EU average per capita income (thus becoming an Objective 1 region). On the contrary, other factors are less accurately proxied by the actual income-based eligibility criteria. The "percentage of the young population" is not significant while "tertiary education attainments" shows a positive sign meaning that in many cases the regions selected for assistance are not those with a relatively poorer human capital endowment.
In the second step of the model, the amount of funds received (by eligible areas) is analysed (Equation 2). The empirical results show that, while significant for the acquisition of the status of assisted region, the socio-

economic factors are not significant for determining the level of the funds received by assisted regions (column a). In other words, the distribution of the funds across the eligible areas does not seem to reflect their actual differentiated socio-economic status. When considering specific socio-economic factors (column b) we notice that only the education level variable shows a high level of significance in 2000-2006: a relatively higher percentage of tertiary educational achievements seems to reduce the amount of funds received in favour of less well endowed regions. The national dummies highlight a certain degree of national bias in the allocation of the funds in favour of some member states (in particular Germany and Spain in 1994-1999 and Spain in 2000-2006), but this bias seems to disappear when the socio-economic conditions are fully accounted for by the Social Factors variable. Such national bias can thus be considered the effect of systematically higher disadvantage of the regions of these countries (which the distribution of the funds is able to reflect), rather than the result of a more favourable treatment in favour of these countries.

Such evidence supports the idea that even if the present eligibility criterion is able to pursue a (rough) discrimination in favour of the relatively more disadvantaged regions, the amount of funds then transferred to assisted regions is not correlated to the extent of their actual socio-economic disadvantage.

Tab.3 - Heckman Selection model, Objective 2 Funds per capita, 1994-1999 and 2000-2006.

	Programming Period 1994-1999		**Programming Period 2000-2006**	
	Equation (2)			
Variables	Coef.	Coef.	Coef.	Coef.
	(a)	*(b)*	*(a)*	*(b)*
Social Factors§	41.24806 *(979.3314)*		15.24312 *(360.1518)*	
Education		-1473.4 *(2604.039)*		-219.959** *(86.8514)*
Agriculture		-2313.08 *(5708.642)*		146.9052 *(213.0774)*
L.T.Unempl.		-292.403 *(1097.94)*		45.70872 *(53.61375)*
Young Pop		-2649.94 *(4296.254)*		-95.0998 *(299.439)*
National Dummies				
de	-14.1343 *(61.11901)*	-21.8045 *(131.9588)*	-15.2183 *(25.85857)*	-16.5432*** *(5.622292)*
it	13.79382 *(83.21526)*	18.6619 *(147.3966)*	-41.2794 *(38.36847)*	-43.8702 *(7.736061)*
at	-31.6908 *(69.25755)*	42.80739 *(211.879)*	-20.1437 *(27.39351)*	-5.56321 *(9.046899)*
be	-4.40015 *(124.5079)*	-54.1565 *(220.7587)*	-6.2263 *(61.19157)*	-17.4202 *(11.50549)*
nl	74.98787 *(81.38781)*	116.1177 *(221.6512)*	1.86291 *(43.41586)*	-1.35525 *(12.65517)*
uk	51.9274 *(82.03706)*	46.94875 *(139.8897)*	15.96409 *(35.93839)*	6.896866 *(6.055499)*
es	151.6018** *(72.02708)*	123.0932 *(218.1189)*	25.25797 *(30.96621)*	20.99423** *(10.78373)*
fi	77.1801 *(113.6932)*	70.01067 *(235.5529)*	-28.5619 *(49.59434)*	-33.2919*** *(11.58116)*
Constant	-66.0253 *(1528.65)*	726.9151 *(1291.69)*	-34.9188 *(511.2596)*	52.246 *(67.34726)*
	Probit Selection Model (Equation 1)			
Social Factors*	1.121132*** *(0.330526)*		1.331961*** *(0.343357)*	
Education		-7.02116** *(2.844077)*		-3.15919 *(2.750046)*
Agriculture		-16.0497*** *(3.350845)*		-14.7694*** *(3.387493)*
L.T.Unempl.		-3.23574***		-3.56761***

		(1.131636)		*(1.134586)*
Young Pop		-10.283*** *(4.739716)*		-19.6541*** *(5.100463)*
Constant	-0.22104 *(0.173643)*	5.339909*** *(1.114868)*	-0.38479*** *(0.178404)*	6.028806*** *(1.164758)*
rho	1	1	1	0.11154
sigma	214.6384	363.2897	96.03772	13.05521
lambda	214.6384 *(1720.033)*	363.2897 *(714.9973)*	96.03772 *(517.8416)*	1.456141 *(28.80728)*

§This variable is the linear combination of the socio-economic variables described in the text and is calculated through the Principal Component Analysis

*, ** and *** denote significance at a 10%,5% and 1% level respectively. SE in parentheses

Table 3 presents, in the same way as in the previous table, the results for the estimation of the two-step Heckman selection model for Objective 2 funds. The results for the probit selection model show that, as expected, objective 2 regions tend to present relatively more favourable socio-economic conditions: the socio-economic factors variable is positive and significant. In addition, as expected, objective 2 regions are mainly industrial regions (an high % agriculture labour force tends to reduce the probability of being "selected") and the population is relatively younger in comparison with other areas. However, the present eligibility criteria seem unable to discriminate the areas with a relative scarcity of skilled labour, as shown by the non-significance of the education variable in 2000-2006. When we move on to the analysis of the determinants of the amount of funds allocated to the regions, we find no sign of any correlation with the underling socio-economic conditions of the assisted areas (except for the education variable in 2000-2006). This evidence supports the idea of an overall weakening of the coherence between the structural funds and their ideal targets operated by means of the expenditure under the Objective 2. On the contrary, where aiming at favouring the socio-economic "restructuring" of declining regions, Objective 2 funds should follow the geography of socio-economic disadvantage.

Tab.4 - H-C OLS model, Objective 1 and Objective 2 Funds per capita, 1994-1999 and 2000-2006.

	Programming Period 1994-1999		Programming Period 2000-2006	
Variables	Coef.	Coef.	Coef.	Coef.
Social Factors§	-327.894*** *(129.8615)*		-162.214*** *(42.01456)*	
Education		771.8936 *(863.6608)*		-10.0642 *(231.26)*
Agriculture		1846.892*** *(566.4197)*		703.0175*** *(195.4019)*
L.T.Unempl.		363.4748 *(264.9683)*		119.7216 *(81.18214)*
Young Pop		3029.142** *(1395.854)*		1200.057*** *(494.6487)*
	National Dummies			
de	294.7922*** *(111.1332)*	205.139** *(81.83613)*	65.45534** *(27.4801)*	35.56319* *(20.35761)*
it	57.38723 *(80.60264)*	46.11072 *(96.23988)*	-9.09578 *(27.36722)*	-22.1725 *(26.60234)*
at	-37.8744 *(63.17935)*	-71.8916 *(99.93928)*	-17.1091 *(25.62074)*	-40.7265 *(37.53585)*
be	153.1352 *(100.7441)*	-15.7337 *(119.9024)*	54.42931* *(26.19563)*	-2.24039 *(30.53526)*
pt	-58.9707 *(73.48608)*	-69.3652 *(93.02556)*	179.3968*** *(42.1867)*	167.1739*** *(52.87925)*
nl	91.98157 *(61.66183)*	-194.286* *(107.3449)*	20.23761 *(19.88387)*	-95.4172*** *(36.32245)*
uk	214.5534*** *(83.53881)*	60.30519 *(56.59665)*	102.6423*** *(27.09222)*	33.96666 *(22.9845)*
es	460.8256 *(87.2242)*	130.3368 *(130.6492)*	173.652*** *(36.87841)*	50.1997 *(47.33312)*
gr	348.8422 *(96.97734)*	61.27249 *(152.8804)*	-9.13357 *(25.41967)*	-114.086** *(52.04321)*
fi	233.367*** *(83.44499)*	82.88095 *(102.4067)*	-15.2933 *(10.75426)*	-78.7236*** *(27.42229)*
Constant	247.3297 *(60.25865)*	-596.29* *(307.5034)*	111.9031*** *(18.47053)*	-178.189** *(89.55031)*
R-squared	0.37	0.46	0.46	0.56
F-stat	8.71	5.47	17.38	7.62
Prob.	0.000	0.000	0.000	0.000

§This variable is the linear combination of the socio-economic variables described in the text and is calculated through the Principal Component Analysis

*, ** and *** denote significance at a 10%,5% and 1% level respectively. SE in parentheses

In table 4 the overall allocation of structural funds under both Objective 1 and 2 is assessed, thus focusing upon their interactions and "composition effect" as parts of a single EU policy action.
The results for the regression of the level of total structural funds per capita on the socio-economic conditions (Equation 3) are presented. The overall amount of funds allocated to the EU regions partially reflects their underlying socio-economic conditions, even if the percentage of the overall variability explained by such factors is relatively small (the R-squared increases from 1994-1999 to 2000-2006 but it is still relatively small). When considering the specific socio-economic factors that influence the distribution of the funds, we notice that agricultural labour force, as a "traditional" source of disadvantage, still seems to be the main driver of the funds at the expense, for example, of the level of human capital accumulation which, instead, has been shown to be particularly relevant in the context of a knowledge based economy. The national dummies, while minimising the problem of spatial autocorrelation, highlight a certain degree of national bias in the distribution of the funds in favour of the "cohesion countries." A bias for which, in the 1994-1999 period, Germany also received particular benefit.
Overall this analysis of the "hidden" determinants of the allocation of the structural funds uncovers an even weaker association between the funds and the structural disadvantage of the EU territories. The introduction of the principle of territorial concentration has not only increased the spatial concentration of the funds but also improved their adherence to the these factors of disadvantage. However, the analysis highlights that there is still much room for further improvement in both respects. In addition, while the general socio-economic structure of each regions should be taken into account by the allocation mechanism of the funds, some specific factors deserve greater attention in the context of the knowledge based economy. This is especially true for human capital accumulation, whose deficiency has been shown insignificant to determine the amount of resources received by the regions but which has become a key source of competitive advantage for both the development of objective 1 and the restructuring of objective 2 regions.

4.3 Socio-economic disadvantage and regional convergence

In the previous section it has been argued that a potential explanation for the lack of correlation observed between the factors of socio-economic

disadvantage and the amount of funds received by the EU regions might be explained in terms of the desire to privilege, in the distribution of the funds, the relatively better endowed regions. This choice could find its theoretical justification in the emphasis on the receptiveness of the local economy as a prerequisite for successful development policies. In this perspective, developed in the framework of the neo-Schumpeterian literature, relatively more favourable socio-economic conditions are necessary for the investment to deliver (Cappellen et. 2003) and, consequently, the policymaker may find it more cost-effective to target funds towards relatively better-off regions (those which show the better development potential) in order to maximise their impact. However, the empirical evidence on the economic performance of the Objective 1 regions over the 1994-2003 period (i.e. from the first year of implementation of the 1994-1999 programming to the most recent year for which regional GDP data are currently available) explicitly contradicts this assumption. When sigma-convergence is considered, by assessing the change in the total variance of the regional income per capita from 1994 to 2003, the lack of convergence for both the whole Europe and the subset of Objective 1 regions is apparent (Table 5).

Tab.5 – Testing sigma-convergence, 1994-2003

Test for sigma convergence

	1994	2003	T_1	p
		All regions		
Sigma^2	33376383.85	43887527.32	0.760498	0.94
		Objective 1 regions		
Sigma^2	9532911.765	11726050.54	0.812969	0.77

However, the comparison between the T_1 statistic[12] (i.e the initial year variance/final year variance ratios) for all the EU regions and that for the Objective 1 only shows that dispersion for regional per capita income

[12] The T_1 statistics is : $T_1 = \hat{s}_1^2 / \hat{s}_T^2$. Where $\hat{s}_1^2$ is the variance of regional income per capita at time 1; $\hat{s}_T^2$ is the variance at time t. This statistic is distributed as a F with (n-1; n-1) degrees of freedom.

increased significantly more in the EU as a whole than in the Objective 1 regions, thus supporting the idea of there being a variety of "clubs" developing at different rates. The lack of a trend towards generalised (unconditional) convergence in the EU regions is confirmed by the simple beta-convergence analysis *à la* Barro-Sala-i-Martin (1992) presented in table 6.

Tab.6 – Regression analysis for beta-convergence

Dependent Variable: growth rate of regional GDP per capita, 1994-2003

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Regions	All	All	Obj.1	Obj.1	All	All	Obj.1	Obj.1
Constant	0.1207***	0.0702***	0.1582	0.1368**	0.017575***	0.01273***	0.02049***	0.1323
	(0.0133)	*(0.0202)*	*(0.0267)*	*(0.054)*	*(0.00066)*	*(0.00144)*	*(0.00101)*	*(0.0645)*
LnGDP‘94	-0.0108***	-0.00406*	-0.01494***	-0.0128**				
	(0.00140)	*(0.00208)*	*(0.00292)*	*(0.00565)*				
Social Factors					-0.000966**	6.88E-05	-0.001790***	-0.00017
					(0.00041)	*(0.00056)*	*(0.00052)*	*(0.00129)*
National Dummies	no	yes	no	yes	no	yes	no	yes
R-Sq	31.60%	59.5%	33.9%	60.5%	4.00%	58.20%	18.4%	60.5%
R-Sq (adj)	31.10%	55.7%	32.6%	49.9%	3.30%	54.30%	16.8%	48.7%
F	59.63***	15.86***	26.18***	5.71***	5.44**	15.04***	11.51***	5.11***

*, ** and *** denote significance at a 10%,5% and 1% level respectively. SE in parentheses

The regression shows a negative coefficient for the log of the initial level of the GDP per capita (Eq.1). However the evidence of unconditional convergence becomes much weaker and almost insignificant when a set of national dummies is introduced into the analysis (Eq.2) thus both controlling for the "national growth" effect and minimising the extent of spatial autocorrelation. The picture changes when the sub-sample of Objective 1 regions is considered separately: the degree of convergence is not only stronger (Eq.3) but it also remains significant after the introduction of the national dummy variables (Eq.4). This confirms the idea of a process of "club convergence" (Quah, 1996) among the Objective 1 regions which explicitly contradicts the idea of a better growth potential of the relatively more well-off regions. On the contrary, the initially more disadvantaged Objective 1 regions seem to grow faster than other potentially better endowed areas. The catching up of the former with the latter uncovers the growth potential of the poorest Objective 1 regions, a potential that would have been more effectively emphasized by a higher degree of concentration of the structural funds. In addition, as shown above, such reduced concentration has been coupled with a lack of correlation between the funds and the factors of structural disadvantage. The growth potential of more disadvantaged regions is confirmed when disadvantage is assessed in terms of socio-economic factors and becomes very apparent when considering the Objective 1 subset alone (compare Fig.1 and Fig.2 where regional growth rates are scattered against socio-economic factors for all the EU15 regions and for the Objective 1 regions only).

Fig. 1 – Regional growth rate (94-03) vs. socio-economic factors, all regions

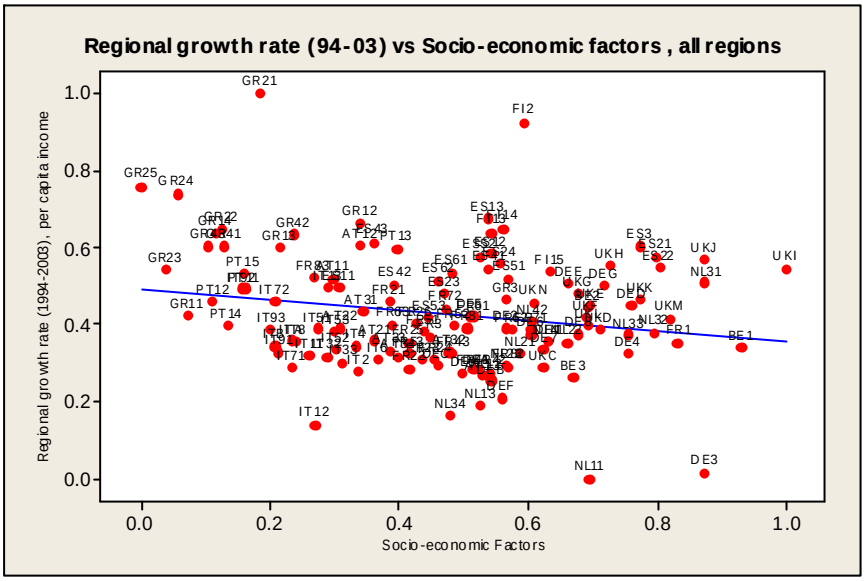
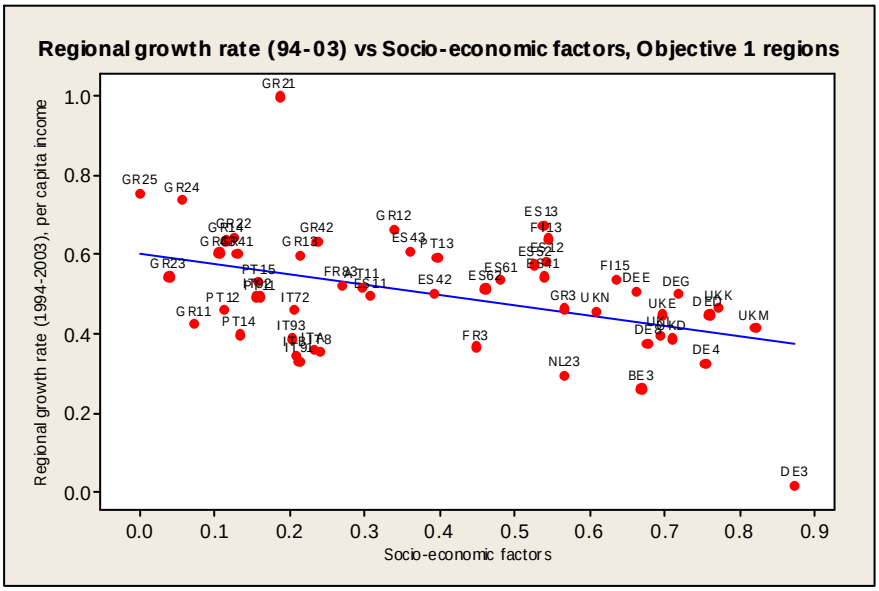


Fig. 2 – Regional growth rate (94-03) vs. socio-economic factors, Objective 1 regions



However, when convergence is assessed on the basis of socio-economic factors (Tab.6; equations 5-8), the evidence suggests that, when national effects are controlled, many socio-economically disadvantaged regions are not able to catch-up with the EU as whole (Eq.7) and with the Objective 1 "club"(Eq.8). In other words, in line with the literature on the socio-economic preconditions for regional growth, we find that such factors have hampered the capacity of Objective 1 regions to converge. Consequently, while there is no evidence to encourage the targeting of resources towards relatively better endowed regions (the contrary is in fact true) there is plenty of evidence to support the necessity for the EU development funds to tackle structural disadvantage. In consequence, the geographical correlation between such disadvantage and the allocation of the funds is confirmed to be a necessary condition for their effectiveness.

5.0 Conclusions: a hardly surprising performance and some considerations on how improvements can be made.

This paper has been aimed at investigating the reasons for the reduced impact of the EU structural funds expenditure on economic and social cohesion. A large part of the existing literature has referred such unsatisfactory performance back to the policy implemented within the EU development policy framework. Some contributions highlighted the distortive effects on the location of R&D intensive firms others the misallocation of the resources across axes. This paper suggests the additional explanation that the origin of the EU development policies problems in delivering the expected benefits might have arisen at a more upstream phase i.e. in the allocation mechanism of the funds to the regions. This mechanism might have caused not only an insufficient territorial concentration of the expenditure but also an insufficient correlation between the funds and the set of socio-economic conditions which have been proven responsible for hampering the economic success of many EU regions.

Our empirical analysis investigated both these issues in order to test this potential explanation for the weak impact of structural funds. The results reveal that the regional distribution of the structural funds shows a degree of spatial concentration in compliance with the principle of concentration. However, while the theoretical discussion supported the idea that the EU funds should be allocated in order to "compensate" the structural disadvantage of the assisted areas (thus maximising their effectiveness), the empirical results suggest that the disadvantage is more spatially

concentrated than the associated funds: in this perspective the present degree of funds' concentration can be judged insufficient. Furthermore, the empirical model uncovered that the weak association between the amounts of regional funds and the above-mentioned sources of competitive disadvantage, especially as far as the problem of human capital accumulation is concerned.

Such an inconsistent spatial allocation of the EU funds is likely to have reduced their capability to impact the regional growth performance of assisted regions and has inevitably produced a bias in the allocation of national resources as well, due to the co-financing mechanism[13], which forced the national co-financing of community funds.

The policy analysis suggests that such geographical allocation of the funds may be either the result of the political dilution of the policy objectives (required by EU political equilibriums) or the effect of an intentional focus on relatively better endowed regions. However, the empirical evidence casts doubt on the rationale of such a bias in favour of the areas supposed to offer a better receptiveness for the funds. Among the Objective 1 regions precisely the most socio-economically disadvantaged have shown a relatively better growth potential over the past years.

Consequently, every effort should be produced not only to promote the territorial concentration of the expenditure (which is a necessary but not sufficient condition for increased effectiveness) but also to increase its capability to target the factors of socio-economic disadvantage.

In the light of such policy conclusion it is possible to highlight some useful elements for an à priori assessment of the cohesion policies for the 2007-2013 budgetary cycle, once data on regional commitments becomes available. While an in-depth analysis of the new cohesion policy is outside the scope of this paper (although it is in our agenda for future research), a few preliminary considerations on the basis of the results of our analysis are possible.

The draft General Regulation[14] for the structural funds, which sets out the objectives and the general rules for delivering Funds for the 2007-2013 programming period, established three objectives: a Convergence Objective (replacing the current Objective 1), to support the economic convergence of

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[13] "Each euro spent at the EU level by cohesion policy leads to further expenditure, averaging 0.9 euros, in less developed regions (current Objective 1) and 3 euros in regions undergoing restructuring (current Objective 2)" COMMUNICATION FROM THE COMMISSION, Brussels, 05.07.2005 COM(2005) 0299, "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013", p. 7..

[14] Structural Funds regulations' package approved by the Council on 5 May. The General Regulation is the document number: 8750/06.

poorer regions with a GDP per capita below 75% of the EU average; a Regional Competitiveness and Employment Objective (replacing the current Objectives 2 and 3), to increase competitiveness and employment in more prosperous regions; and a Cooperation Objective (which replaces the current Interreg Community Initiative), to finance cross-border and trans-national cooperation projects. In addition, the General Regulation defined eligibility criteria for the beneficiary regions for each objective: these new criteria pursued the difficult task of tackling the backwardness of the regions of the EU 25 without penalising (in terms of funding) the most disadvantaged areas of the EU 15 members. The structure of the policy, emerging from both the General Regulation and the allocation of financial resources in the EU budget, seems coherent with the call for an increased thematic and geographical concentration put forward by the July 2005 Strategic guidelines (in line with our policy conclusions) while the reduction in the number of objectives, thanks to the unification of the former Objective 2 and 3, would appear to favour the thematic concentration of the funds. In addition, the redirection of the "non-geographically" targeted Objective 3 resources towards the new "Regional competitiveness and employment objective" (whose eligibility is limited to the 2000-2006 Objective 1 regions no longer eligible under the "convergence objective" plus a list of regions suggested by the Member states) sets out to favour geographical concentration as well.

Furthermore, the allocation of financial resources across objectives would appear to improve the targeting as regards the more disadvantaged areas. The financial resources devoted to the "Convergence Objective" account for 81.7% of the total resources (61.7% from ERDF and ESF regional and national programmes + 20% from cohesion fund) against the 64% devoted to Objective 1 regions and the 8.4% to Cohesion countries in 2000-2006. This change in the financial emphasis of the policy at the expense of Objective 2 expenditure, that our analysis has shown to be the less territorial concentrated, should favour, in the perspective of our results, the overall effectiveness of the structural policy. However, in our view, the critical issues stem, once again, from the spatial distribution of the available resources in relation to the sources of socio-economic disadvantage. On the basis of the results presented in this paper two further changes in the allocation mechanism would be necessary:

a) the increase of the 75% of the per capita income of the EU 25 average threshold for Objective 1 eligibility;

b) the calibration of the total amount of funds for which a group of regions can apply, on the basis of set of socioeconomic indicators.

As shown in the empirical analysis the 75% of the EU average per capita income threshold for Objective 1 eligibility has been able to guarantee a certain degree of territorial concentration of the funds. Since concentration needs to be increased in line with the concentration of the socio-economic disadvantage the raise of this threshold seems the most effective way to increase the territorial concentration of the funds.

However, the eligibility criteria based upon the level of GDP per capita provides only a rough assessment of the very differentiated capabilities of the local economies vis à vis the Lisbon agenda objectives. Consequently, once eligibility is granted on the basis of this rule, areas (and the associated funds) should be further differentiated on the basis of a wider set of socio-economic indicators, thus improving the "fit" between the spatial distribution of the fund and the sources of socio-economic disadvantage. This would maintain the level of financing related to the planning capabilities of each regions (since the final commitments would still depend upon the plans presented by the assisted areas) but would reduce the endogeneity of the actual allocation mechanism, which inevitably tends to favour the actors with a better institutional endowment.

As an example, in the 2007-2013 General Regulation, a specific amount of the resources devoted the Convergence Objective, remains earmarked to the 16 regions whose GDP per head is below 75% of the EU 15 average but greater than 75% of the pro capita income of the EU 25 average (i.e. the regions loosing their eligibility due to the "statistical effect"). This subdivision in the allocation of the convergence funds aims at reducing the resources devoted to these regions considered, on the basis of their GDP, more advantaged than other convergence regions. However, in this case, the application of the GDP criteria has granted "automatic" eligibility to a very heterogeneous set of regions, thus allowing funds to flow towards relatively more advantaged areas at the expense of others where, although the GDP per capita is above the 75% of the EU average, the socioeconomic conditions are more critical than in some of the other 86 convergence regions. The same is true for the complex of the 86 convergence regions, which includes without any differentiation almost the entire territory of the new member states, although a vast amount of literature has highlighted an astonishing variety of socio-economic situations in place within these countries. The application of a wider set of indicators to further differentiate among this convergence regions, would have allowed for a finer *à priori* targeting of the resources.

Consequently, even if the final spatial allocation of the funds needs to be assessed once it becomes possible to calculate regional commitments, there are some reasons to be sceptical about the capability of the new budgetary

cycle to significantly improve the policy with respect to the issues analysed in this paper since the changes in the allocation mechanism seem still insufficient to correct the mismatches highlighted in our analysis. Such critical issues (and geographical concentration in particular) have been explicitly considered by the European Commission when assessing the weaknesses of the past programming periods. However, when the Commission's analysis has to be balanced against both the individual countries' claims in terms of budget equilibriums and/or inaccurate diagnoses on where it is most worth investing, the implementation of concrete corrective measures becomes a very gradual process.

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APPENDIX A - The weight matrix and the Moran's I

The Moran's I is calculated on the basis of the following formula:

$$I = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}(x_i - \bar{x})w_{ij}(x_j - \bar{x})}{\sum_{i=1}^{n}(x_i - \bar{x})}$$

Where w_{ij} is a sequence of normalised weights that relate observation i to all the other

observations j in the data. Values of I larger (smaller) than the expected value E(I)=-1/(n-1) signal the presence of positive (negative) spatial autocorrelation.

In our empirical application the element w_{ij} of the matrix of the normalised weights is:

$$w_{ij} = \frac{\frac{1}{d_{ij}}}{\sum_{j}\frac{1}{d_{ij}}}$$

where d_{ij} is the average trip-length (in minutes) between region i and j calculated by the IRPUD (2000) for the computation of the Peripherality Indicators and made available by the European Commission.

APPENDIX B – The results for the Principal Component Analysis.

The principal component analysis (PCA) is "a statistical technique that linearly transforms an original set of variables into a substantially smaller set of uncorrelated variables that represents most of the information in the original set of variables: (…) a smaller set of uncorrelated variables is much easier to understand and use in further analysis than a larger set of correlated variables" (Duntenam, 1989 p.9). Through the PCA the original variables (in the case of our analysis the variables shown in literature as representative of the socio-economic disadvantage of the EU regions) are linearly combined by means of a set of "weights" (a_1, a_2, …, a_k) calculated in order to maximise (under the constraint of that the sum of the squared weights is equal to one) the variability of the resulting indicator, i.e of the principal component (our Social Factors variable).

Consequently the i-th principal component is:

$$y_i = a_{i1}x_1 + a_{i2x2} + \ldots + a_{ip}x_p$$

where (a_{i1},a_{i2} a_{ip}) are the wights and x_1, x_2, … ,x_k are the k variables.

It is possible to calculate as many PCs as the original variables under the constraint of non-correlation with the previous ones. Anyway the PCs are able to account for a progressively decreasing amount of the total variance of the original variables. Consequently, the procedure allow us to concentrate our attention on the first and limited number of PCs, which are the most representative of the phenomenon under analysis.

Table B-1 shows the Eigenanalysis of the Correlation Matrix. The first PC alone accounts for around 43% of the total variance with an Eigenvalue significantly larger than 1, the second PC accounts for an additional 22% of the total variability with an Eigenvalue still larger than 1. The first two principal components therefore explain a significant part of total variability (65%).

Tab. B-1 - Eigenanalysis of the Correlation Matrix

Eigenvalue	2.566	1.3311	0.8847	0.6542	0.5381	0.0259
Proportion	0.428	0.222	0.147	0.109	0.09	0.004
Cumulative	0.428	0.65	0.797	0.906	0.996	1

The coefficients of the first PC (Table B-2) assigns a large weight to the educational achievements of the population (0.576) and the labour force (0.551) and to the participation in Life Long Learning Programmes (0.383). A negative weight is, as expected, assigned to the agricultural labour force (-0.446) and, with a smaller coefficient, long-term unemployment (-0.139). The weight of the young population (0.006) is much smaller but positive. This first principal component provides us with the "joint measure" for each

region's socio-economic conditions. Consequently, the first principal component's scores are computed from the standardised[15] value of the original variables by using the coefficients listed under PC1 in table B-2.

Tab. B-2 - Principal Component Analysis: Principal Components's Coefficients

Variables	*PC1*	*PC2*	*PC3*
Education Population	0.576	-0.218	-0.043
Education Labour Force	0.551	-0.318	0.05
Life-Long Learning	0.383	0.326	0.355
Agricultural Labour Force	-0.446	-0.227	0.068
Long Term Unemployment	-0.139	-0.505	0.802
Young People	0.006	0.662	0.471

[15] Standardised in order to range from zero to 1